JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

M.Tech.-II Semester (CSE-Data Science)

COURSE CODE (CREDITS): 22M1WCI231 (3) MAX. MARKS: 15

COURSE NAME: ADVANCED COMPUTATIONAL TECHNIQUES

COURSE INSTRUCTOR: SST MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

(c) Use of a scientific calculator is allowed.

Q. No.	Question	CO	Marks
Q1	**a)** Mention two major differences between chopping error and round-off error. **b)** Explain machine epsilon (ϵ_{mach}).	1	3
Q2	**a)** Use the Newton-Raphson method to find a real root of the transcendental equation $x^2 + 4\,sin\,x = 0$, correct to three decimal places. **b)** What is the order of convergence of this method?	4, 6	3
Q3	Apply Graeffe's root-squaring method to find all the roots of the equation $x^4 - 3x + 1 = 0$, by squaring only twice.	4, 6	3
Q4	Perform only two iterations of the Jacobi method to solve the following system of linear equations: $20x + y - 2z = 17$ $3x + 20y - z = -18$ $2x - 3y + 20z = 25$	4, 7	3
Q5	Determine the largest eigenvalue and the corresponding eigenvector for the following matrix: $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$, using Rayleigh's power method.	4, 7	3

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